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Artificial Intelligence and Its Role in Supporting Tourism Innovation and Achieving Sustainable Development - An Economic Study within the Legal Framework Regulating Ecotourism in Algeria –

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Abstract

This study aims to analyze the role of Artificial Intelligence (AI) in supporting tourism innovation and achieving sustainable development in Algeria, within the economic and legal frameworks governing ecotourism. The focus is on examining the relationship and integration among these variables.

The study's findings demonstrate the significance of AI in maximizing revenues and improving operational efficiency for the country, provided that rules and mechanisms are available to facilitate the deployment of this type of modern technology in the ecotourism sector. This, however, is challenging to achieve under the current legislative framework, such as Law 18-07 on Data Protection, which potentially threatens the flourishing of ecotourism in Algeria.

Keywords: Artificial Intelligence, Tourism Innovation, Sustainable.

1. Introduction:

The world is witnessing a massive economic and structural revolution that is reshaping the nature of the international economic landscape. This transformation stems from rapid technological developments, with Artificial Intelligence (AI) at the forefront of these innovations. AI has become a major driving force in restructuring entire economic sectors by enhancing efficiency, providing customized solutions, and creating positive disruption in traditional business models.

In the context of the Algerian economy, and within the country's efforts to implement structural reforms and reduce fluctuations in the energy market, tourism has gained exceptional strategic importance. This sector is a key driver of comprehensive development, contributing to job creation, revitalizing various regions, and improving infrastructure. Since tourism represents a vital element in diversifying national income sources, it helps reduce the costly dependence on hydrocarbons and supports the financial stability of the state by decreasing its reliance on a single income source the energy sector. This diversification ensures the state's ability to confront economic crises and global energy price fluctuations more effectively.

There is, therefore, an urgent need to focus on modernizing and developing the tourism sector by adopting advanced technologies, particularly Artificial Intelligence, across all components of the Algerian tourism industry, with an emphasis on tourism innovation to improve service quality and achieve competitiveness.

Based on the above, and in light of Algeria's efforts to modernize its tourism sector through Artificial Intelligence, the question arises: Does the current legal framework for ecotourism align with the requirements and conditions of this technology, and what are the real prospects for the country's advancement in this vital field?

1.1. Study Hypotheses:

Based on the central research problem, which focuses on the extent to which the Algerian legal framework aligns with the requirements of Artificial Intelligence in the ecotourism sector and the potential prospects for advancement, a set of hypotheses has been formulated as preliminary answers to these questions, as follows:

- **First Hypothesis:** The current legal framework for ecotourism in Algeria requires fundamental amendments to keep pace with the requirements and regulations of Artificial Intelligence technologies.
- **Second Hypothesis:** The successful implementation of AI technologies in ecotourism in Algeria requires ethical, legal, and institutional frameworks that ensure the safe development and use of AI systems, in addition to parallel investment in digital infrastructure and human competencies.
- **Third Hypothesis:** The successful application of Artificial Intelligence entails achieving an optimal balance between protecting environmental resources and increasing operational efficiency, thereby supporting the economic sustainability of the sector.

1.2. Importance of the Study:

The importance of this study lies in providing an analysis of the interactive relationship between Artificial Intelligence systems and the ecotourism sector—an area that still suffers from a significant knowledge gap in economic and legal studies within the region. The study offers an integrated methodological approach that combines an economic analysis of the feasibility of innovation with a legal analysis of governance requirements.

Study Objectives:

This study seeks to achieve the following main objectives:

- Identify and analyze the extent to which the current legal and regulatory framework for ecotourism in Algeria aligns with the requirements and conditions of using Artificial Intelligence technologies.
- Reveal the most prominent legal and legislative challenges that may hinder the adoption and implementation of Artificial Intelligence in the Algerian ecotourism sector.
- Explore future prospects for employing Artificial Intelligence as a tool to support innovation and achieve sustainable development in the sector.

1.3. Providing a set of legislative and practical recommendations and proposals to enable Algeria to advance in this vital field.

1.4. Study Limitations:

This research paper focuses on examining the role of Artificial Intelligence in supporting tourism innovation and achieving sustainable development within the legal framework regulating ecotourism in Algeria.

1.5. Study Methodology:

To address the research problem and test the validity of the proposed hypotheses, the descriptive-analytical approach was adopted by presenting the reality of Artificial Intelligence in supporting tourism innovation and achieving sustainable development in Algeria within the legal framework governing ecotourism in the country. The study is structured into three sections:

- **Section One:** Ecotourism and Sustainable Development.
- **Section Two:** Tourism Innovation and Artificial Intelligence.
- **Section Three:** The Economic and Legal Dimension.

2. Ecotourism and Sustainable Development:

2.1. The Concept of Ecotourism:

The modern concept of tourism combines the pleasure of exploration with responsibility toward the environment. It represents a balance between benefiting from natural resources and preserving them for future generations. Given the importance of this new orientation in the field of tourism, it is necessary to examine the concept of ecotourism.

The International Ecotourism Society defines ecotourism as "a form of responsible travel to natural areas that conserves the environment and sustains the well-being of local people." (Charf, 2019, p. 163).

The World Wildlife Fund (WWF) defines tourism as "travel to natural areas that have not been polluted and whose natural balance has not been disturbed, in order to enjoy their landscapes, plants, wildlife, and cultural heritage, past and present." (Mansaf & Oulad Zaoui, 2016, p. 222).

2.2. Ecotourism and Its Impact on Sustainable Development:

The relationship between tourism and the environment is a delicate balance between development and environmental protection. The 1980 Manila Declaration on World Tourism emphasizes that tourism needs should not be met in ways that harm the social and economic interests of local residents in tourist areas, nor the environment, natural resources, or historical and cultural sites, which are considered key attractions for tourists. (Khenfer & Khenfer, 2006, p. 55).

The declaration highlights the vital role of sustainable ecotourism in achieving a balance between tourism activity and environmental preservation by protecting natural, environmental, and cultural resources. For this reason, environmentally sound tourism planning is an essential requirement to ensure the long-term development and sustainability of ecotourism.

Sustainable tourism is the meeting point between the needs of visitors and those of the host community, leading to the protection of future development opportunities. All resources must be managed and all economic and social needs met without compromising cultural heritage or the environmental pattern. (Ben Ghadbane, 2015, p. 68).

This relationship is based on:

2.2.1. Ecotourism and Economic Development:

Ecotourism is linked to economic development through the following:

- Revenues generated from ecotourism activities, whether in local or foreign currency, which contribute to improving the balance of payments, increasing the state's foreign exchange reserves, and boosting public budget revenues such as taxes. This positively reflects on national income and living standards.
- Enhancing national income and economic returns by diversifying income sources through activities connected to tourism in general and ecotourism in particular. This is accompanied by

progress in various economic sectors such as transportation, accommodation, hotels, camping, and food services. Therefore, ecotourism is considered a key factor in improving living standards and reducing poverty.

- Using ecotourism revenues to strengthen infrastructure, which helps improve the national economy's absorptive capacity, in addition to encouraging local investments especially since ecotourism relies on local elements and services in establishing environmentally friendly tourist areas and preserving the environment. It also contributes to local and urban development by creating and developing new areas for tourist attraction, which positively affects the overall economy and the distribution of income across tourist regions. (Bouki & Qaddouri, 2025, p. 591).

2.2.2. Ecotourism and Social Development:

(Daradkeh, Al-Alwani, Kafi, & Abu Rahma, 2014, p. 69).

Ecotourism is considered community-friendly, as it relies on utilizing the available resources and individuals within the community. It contributes to strengthening social relationships, enhancing and improving the process of modernizing society, and transforming isolated communities into open and connected ones. It also helps keep the community in a state of continuous activity, reducing seasonal risks and the resulting social anxiety and instability.

2.2.3. Ecotourism and Environmental Development:

The relationship between ecotourism and environmental development is reflected in several key points summarized as follows: (Chayen & Laoubi, 2024, p. 32).

- Preserving environmental balance and achieving environmental security.
- Protecting natural life from pollution and maintaining environmental quality.
- Conserving water and energy resources and establishing a continuous harmony with the environment.
- Promoting distinctive architectural designs.

3. Tourism Innovation and Artificial Intelligence:

3.1. The Concept of Tourism Innovation and Its Forms:

The tourism sector is considered one of the fastest-growing sectors in the global economy, which confirms the existence of continuous change and development in this field. This transformation is driven by innovation, which has been applied in the tourism industry either directly or indirectly, and in an accumulative manner whether through gradual changes or, at times, through radical shifts. These innovations have been the main factor in developing the activities of tourism institutions, the behavior of tourists themselves, or other related factors.

Sometimes, the use of a specific innovation under certain conditions leads to a fundamental transformation in the overall concept of tourism and contributes to a qualitative leap in the tourism sector. (Al-Aswad & Megrani, 2018, p. 66).

3.2. Applications of Artificial Intelligence in Supporting the Digital Tourism Industry in Algeria:

The role of Artificial Intelligence technologies appears across various aspects of tourism activities as follows (Chaki & Boukhari, 2021, p. 224):

- **The importance of AI applications in digital tourism marketing and promotion:**Through customer relationship management by providing multiple offers of goods or services with just a few clicks, as well as through digital promotional posters supported by camera-based advertising displays. AI-powered recommendation tools also enhance the commercial efficiency of e-

commerce platforms by improving the conversion rate the relationship between the number of visitors and actual buyers.

- **AI applications in digital tourism security:** AI systems analyze big data and provide several opportunities to achieve and maintain security. Big data analytics enables the detection of operational insights that decision-makers rely on to improve various security-related matters.
- **AI applications in digital tourism transportation:** As transportation becomes more advanced, tourism activity grows. AI technologies can be integrated into transportation systems, such as combining new technologies in passenger cars and public transport to facilitate daily life. These systems are connected and equipped with various sensors, radar devices, cameras, and GPS systems.
- **AI applications in completing digital tourism transactions:** By simplifying electronic payment processes through banks and settling digital tourism-related financial transactions. AI also enables the emergence of intelligent agents or personal assistants designed to help users in their daily tasks. Additionally, AI supports the activation of financial markets, which play an essential role in the tourism sector and represent an ideal field for AI applications, thus facilitating business performance in digital tourism management.

3.3. The Role of Innovation in Enhancing Sustainable Ecotourism:

Innovation in the tourism sector helps develop tourism through the following: (Al-Miammar, n.d.).

- **Innovation in tourism programs, services, and products:** Innovation in tourism services and products is essential to keep pace with changing consumer preferences, enhance visitor experiences, and maintain competitiveness in the tourism industry.
- **Innovation in tourism experience processes:** This involves implementing new strategies, technologies, and practices to streamline operations, improve efficiency, and enhance overall customer satisfaction. Examples include digital online booking systems, where travel agencies, hotels, and tour operators provide user-friendly websites and mobile applications that allow travelers to book accommodations, flights, tours, and activities smoothly.
- **Innovation in marketing tourism experiences:** This includes adopting new strategies and techniques to promote destinations, attractions, and accommodations to travelers.
- **Social innovation in cultural tourism experiences:** This involves developing new methods, activities, and initiatives that offer travelers immersive, authentic, and meaningful interactions with local culture, heritage, and traditions.
- **Innovation in sustainable tourism experiences:** With increasing concerns about environmental preservation and responsible tourism, interest in innovative sustainable solutions has grown. This includes developing and implementing new practices, technologies, and initiatives that reduce environmental impact, support local communities, preserve culture, and enhance visitor experiences.
- **Innovation in tourism during crises:** When crises occur, such as natural disasters or pandemics, tourism businesses develop and implement new strategies, technologies, and initiatives to mitigate risks, ensure traveler safety, and sustain the tourism industry during difficult times. These include introducing flexible booking policies, health- and safety-centered protocols, and diversifying tourism offerings.

4. Economic and Legal Dimension:
4.1. The Economic Dimension of Employing Artificial Intelligence in Ecotourism:

The economic impact of employing Artificial Intelligence in ecotourism can be summarized in the following points:

- **Maximizing and diversifying revenues:** AI enhances tourist attraction and increases tourist spending by accurately analyzing tourist behavior and preferences to tailor services and tourism offerings based on their needs. AI is also used to determine the optimal pricing of rooms and services in real time based on supply and demand factors, ensuring maximum possible profit without compromising the quality of the ecological product. These advantages enhance the diversification of national income sources and reduce dependence on the central sector of the economy (hydrocarbons).

- **Increasing operational efficiency and reducing costs:** This occurs through efficient resource management, as AI systems are used to monitor and control the consumption of vital resources such as water and energy in ecotourism establishments with high precision, ensuring reduced waste and significantly lower costs. AI also contributes to demand forecasting by studying expected tourist flows and their needs, thus improving the quality of services provided to them.

4.2. Artificial Intelligence and the Legal Framework Regulating Ecotourism in Algeria (UNESCO, 2021):

The General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO), held during its 41st session in Paris from 9 to 24 November 2021, adopted a special Recommendation on the Ethics of Artificial Intelligence. The Recommendation states: "This report presents the Recommendation on the Ethics of Artificial Intelligence, issued as a result of the General Conference of UNESCO. The Recommendation examines AI ethics through a systematic normative approach based on a comprehensive, multicultural framework. It aims to guide the development of ethical Artificial Intelligence. The Recommendation identifies ten fundamental principles including safety and security, fairness and non-discrimination, proportionality and 'do no harm,' sustainability, transparency and explainability, and awareness and literacy supported by more practical policy measures on how these recommendations can be achieved and implemented."

Since Algeria is one of the signatory states to this Recommendation (as a member of UNESCO), it is ethically and politically committed to working toward the implementation of these principles. These principles are directly linked to the right to privacy and data protection. This requires Algeria to review Law No. 18-07 of 2018, related to the protection of natural persons in the processing of personal data, to assess its adequacy in addressing the challenges posed by AI in the tourism sector.

Considering UNESCO's Recommendation on the Ethics of Artificial Intelligence which adopts a comprehensive, multicultural normative framework and sets out ten core principles such as safety, security, fairness, non-discrimination, proportionality, sustainability, transparency, explainability, awareness, and literacy the Recommendation is supported by practical policy actions for its implementation.

In general, Law 18-07 constitutes a foundational framework for data protection; however, it is insufficient to regulate the complexities of AI systems. The law assumes that the purpose of data processing must be determined before data collection and that consent must be obtained accordingly. Yet AI systems particularly machine learning discover new patterns and uses that were neither known nor declared at the time consent was initially obtained.

In its current form, the law does not provide an effective mechanism to address these newly discovered purposes, nor does it require companies to renew consent or immediately notify data subjects of changing purposes. This creates a significant legal gap.

Here we may ask: If the use of Artificial Intelligence in tourism innovation and achieving development aims to attract tourists and ensure their comfort, why is data used against them such as increasing room prices when analyzing specific tourist data, where the result of this analysis may lead to booking cancellations shortly after? This explains the necessity of good governance of Artificial Intelligence through the optimal use of data, which is divided into two uses:

5. Challenges and future opportunities for achieving smart and sustainable tourism:

Ecotourism has great importance at both the economic and social levels. It represents a vital source of income for the state, contributing to diversifying revenue sources and strengthening the economy. This importance increases especially in light of recurring global economic challenges and crises. Therefore, to preserve these ecotourism assets within a framework of smart and sustainable tourism, necessary measures must be taken: (Bouadra, 2018, p. 11).

- Reducing the negative impacts of tourism on natural, cultural, and social resources in tourist areas.
- Educating tourists about the importance of preserving the original environment in natural areas.
- Emphasizing the importance of responsible investment and focusing on cooperation with local authorities to meet the needs of local residents and preserve their customs and traditions.
- Conducting social and environmental research in tourist and ecological areas.
- Working to maximize returns for the host country by using local natural resources and human capacities.
- Ensuring that tourism development moves hand in hand with social and environmental development, meaning that developments in all fields occur simultaneously so the community does not experience sudden shocks.
- Relying on infrastructure compatible with environmental conditions, reducing the use of trees for heating, and preserving wildlife and cultural heritage.
- Focusing on the carrying capacity of ecotourism sites the maximum number of tourists who can be accommodated with all required services provided without pressure.
- Integrating local residents, raising their environmental and tourism awareness, and encouraging income-generating projects for them, such as traditional handicrafts.
- Combining all efforts for the success of ecotourism through cooperation among tourism-related sectors, such as the public and private sectors, official institutions, NGOs, and local communities.
- Preventing the disruption of environmental balance caused by tourist behavior in ecotourism settings, which may lead to pollution. This shows another relationship between ecotourism and sustainable development: although development is intended to promote human well-being, it has often become a means of exhausting environmental resources and causing environmental harm and pollution.
- Achieving a balance between tourism, the environment, and the economic and social interests upon which tourism is based.
- Biodiversity, natural environmental purity, and the survival of rare and endangered species are fundamental factors in promoting ecotourism. Therefore, it must be taken into account that tourism and environmental protection are interconnected and complementary: tourism cannot thrive in a degraded environment, and environmental degradation limits the opportunity for tourism development.

6. Conclusion:

Our study focused on modern technologies and their applications in creating tourism innovation to achieve sustainable development. At the forefront of these technologies are Artificial Intelligence

(AI) applications in Algeria and the necessity of implementing them within the legal and economic framework related to tourism in the country. Based on the above, this study led to several findings, the most important of which is that the contribution of AI to achieving sustainable development in the ecotourism sector in Algeria represents a real opportunity with promising prospects, especially since Algeria possesses enormous ecological tourism potential that enables it to generate substantial economic returns by efficiently managing and protecting these unique natural resources.

However, its implementation depends on an advanced legal framework that ensures wise governance of modern technologies, including AI particularly regarding the transparent use of data in ways that serve both ecotourism and the economy. This stands in contradiction with Law 18-07 on data protection.

- In addition, the presence of ethical, legal, and institutional frameworks is essential to ensure the safe development and use of AI systems, along with investment in developing human competencies and establishing proper digital infrastructure.

Recommendations and Proposals:

Based on the findings, the study recommends the following:

- Amending Law 18-07 or issuing a complementary specialized regulation that enforces transparency and guarantees the tourist's right to post-decision explanation resulting from the use of AI and the processing of tourist-provided data, especially regarding pricing or discriminatory decisions.
- Auditing the algorithms used in the tourism sector to ensure they are free from any bias or discrimination against tourists.
- Strengthening partnerships between tourism institutions and Algerian universities to invest in human competencies capable of developing AI systems in the ecological tourism field.
- Emphasizing the integration among innovation, the environment, and the economy to achieve sustainable development.

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